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Artificial Stress Diffusion Applied to the Simulations of Oldroyd-B Fluid Flows

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Abstract Numerical simulations of Oldroyd-B fluids are a challenging problem for high values of Weissenberg (We), known as the High Weissenberg Number Problem. This problem is characterized by the instability of the numerical solution for higher values than some critical value of the parameter We. One of the tecnique adopted to stabilize the numerical algorithm is added the stress diffusion term into the transport equations for viscoelastic stress tensor with a special care to keep the modified model consistent with the original problem. In this talk, several variants of artificial diffusion tensor are presented, focusing on practical aspects of its implementation and use.
Joint work with Tomás Bodnár, Falculty of Mechanical Engineering CTU, in Prague.